FIG.1

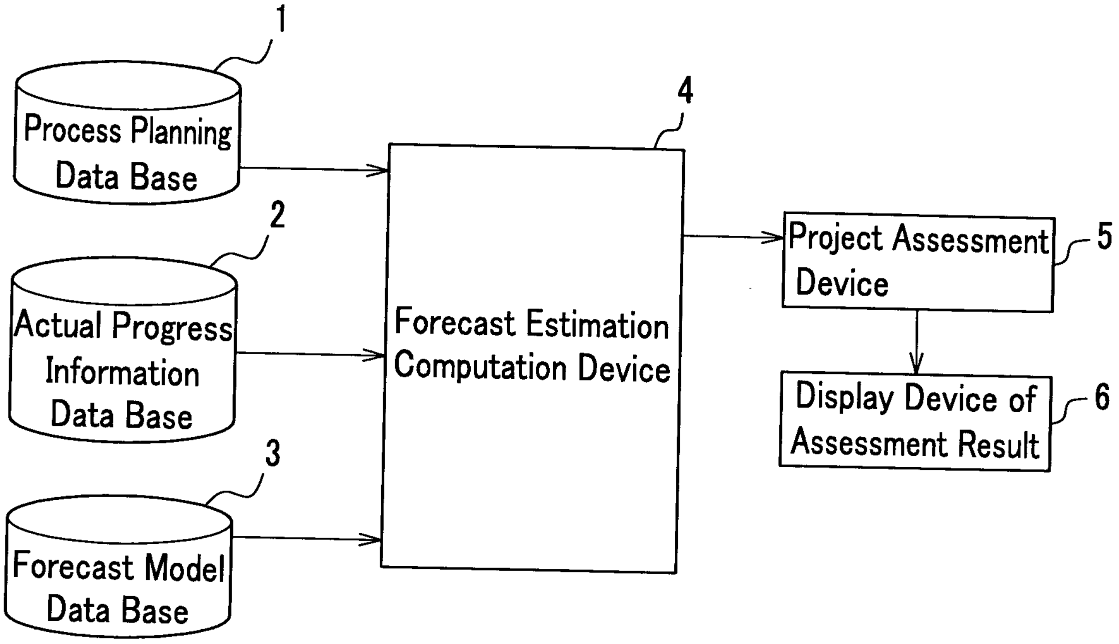

1
Process Planning Data Base
2
Actual Progress Information Data Base
3
Forecast Model Data Base
4
Forecast Estimation Computation Device
Project Assessment Device
5
Display Device of Assessment Result
6

FIG.2

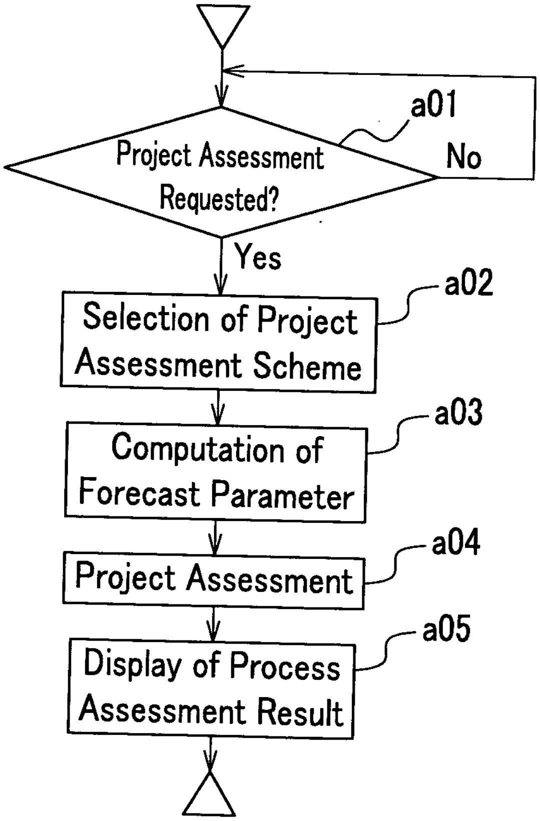

Project Assessment Requested?
a01
No
Yes
Selection of Project Assessment Scheme
a02
Computation of Forecast Parameter
a03
Project Assessment
a04
Display of Process Assessment Result
a05

FIG.3

	Code	Item	Example
101	0	Process Code	1
102	1	Job Name	weld of pipe 1
103	2	Job Code	1
104	3	Part Code	45
105	4	Contractor Code	12345
106	5	Estimated Materials	100
107	6	Estimated Workmen	10
108	7	Estimated Workdays	5
109	8	Estimated Man-Days	50
110	9	Estimated Starting Date	50
111	10	Critical Processes in Pre-Sequential Process:	3
112	11	Critical Processes in Post-Sequential Process:	2
113	12	Critical Starting Date:	45
114	13	Critical Completion Date:	60

FIG.4

	Code	Item	Example
201	0	Actual Material Quantities (accumulation)	250
202	1	Actual Man-Days	5000
203	2	Actual Starting Date	52
204	3	Actual Ending Date	75

FIG.5

	Code	Item	Example
301	0	Job Code	1
302	1	Variance of Starting Date Average	0
303	2	Variance of Starting Date Standard Deviation	1.2
304	3	Variance of Starting Date Minimum Allowance	−2
305	4	Variance of Starting Date Maximum Allowance	3
306	5	Variance of Elementary Unit Average	0.5
307	6	Variance of Elementary Unit Standard Deviation	3.5
308	7	Variance of Elementary Unit Minimum Allowance	−2.5
309	8	Variance of Elementary Unit Maximum Allowance	10

FIG.6

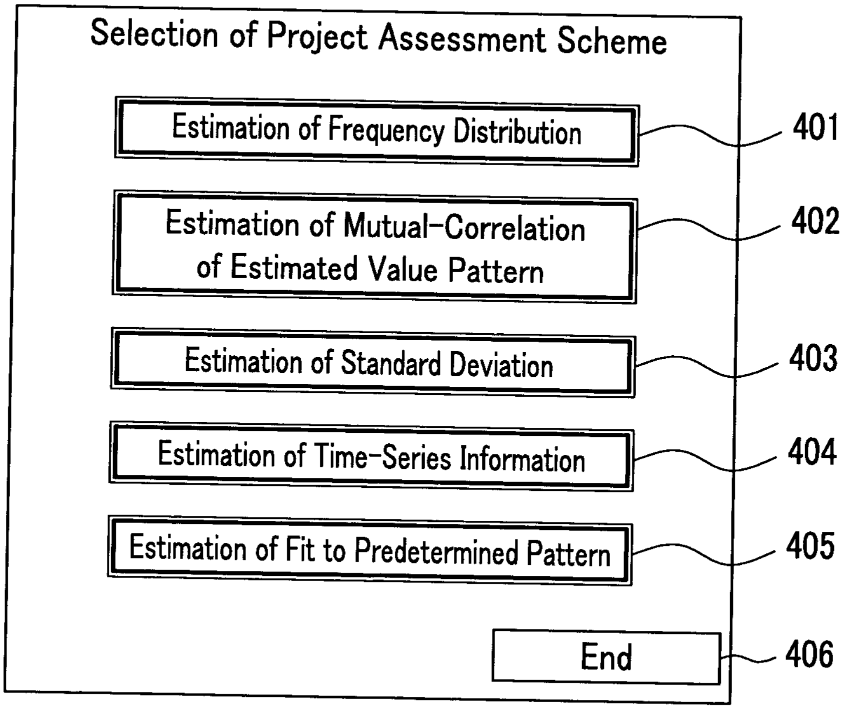
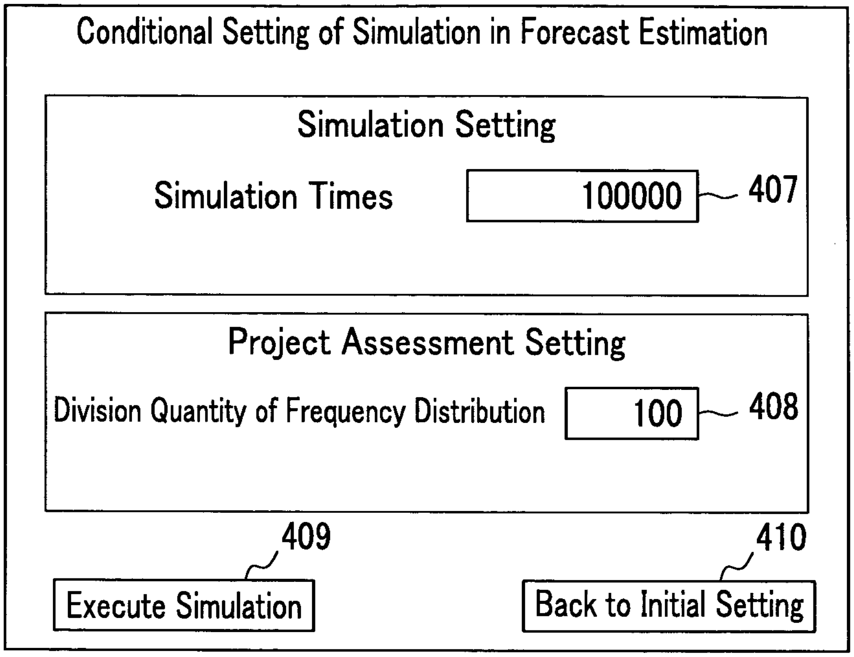

Selection of Project Assessment Scheme
Estimation of Frequency Distribution
401
Estimation of Mutual-Correlation of Estimated Value Pattern
402
Estimation of Standard Deviation
403
Estimation of Time-Series Information
404
Estimation of Fit to Predetermined Pattern
405
End
406

FIG.7



Conditional Setting of Simulation in Forecast Estimation

Simulation Setting

Simulation Times: 100000

Project Assessment Setting

Division Quantity of Frequency Distribution: 100

FIG.8

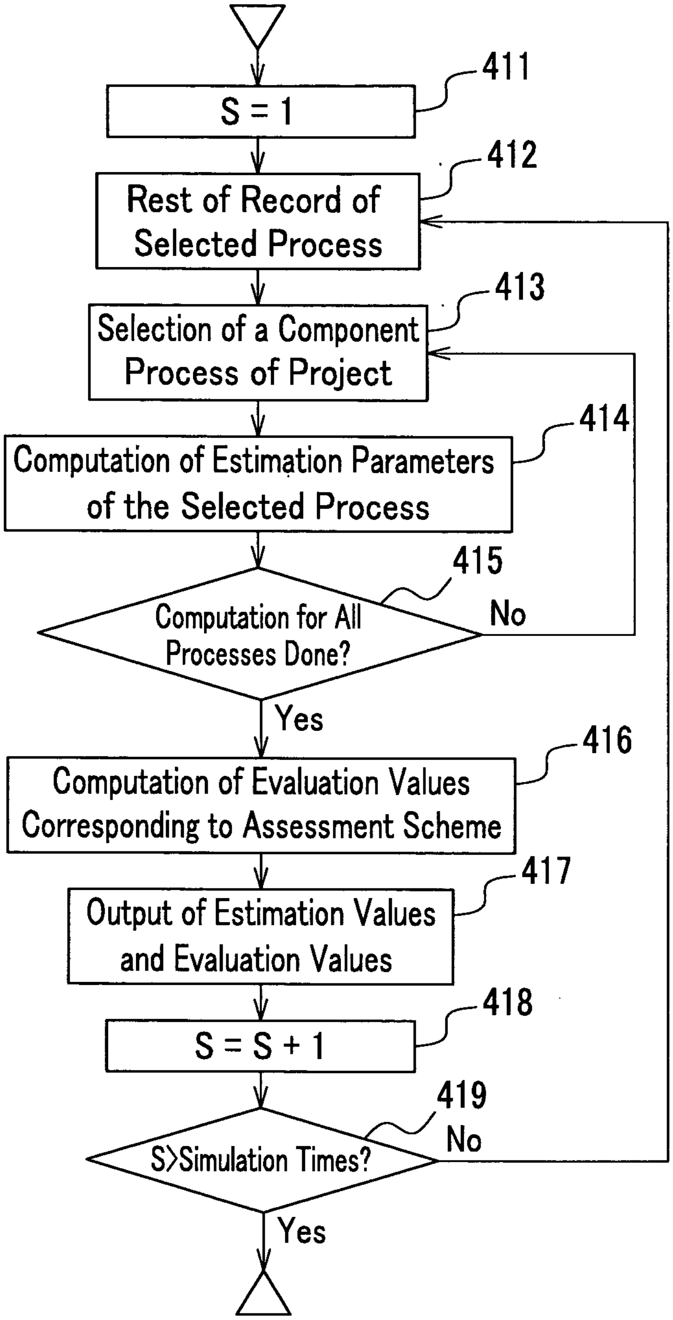

411
S = 1
412
Rest of Record of Selected Process
413
Selection of a Component Process of Project
414
Computation of Estimation Parameters of the Selected Process
415
Computation for All Processes Done?
No
Yes
416
Computation of Evaluation Values Corresponding to Assessment Scheme
417
Output of Estimation Values and Evaluation Values
418
S = S + 1
419
S>Simulation Times?
No
Yes

FIG.9

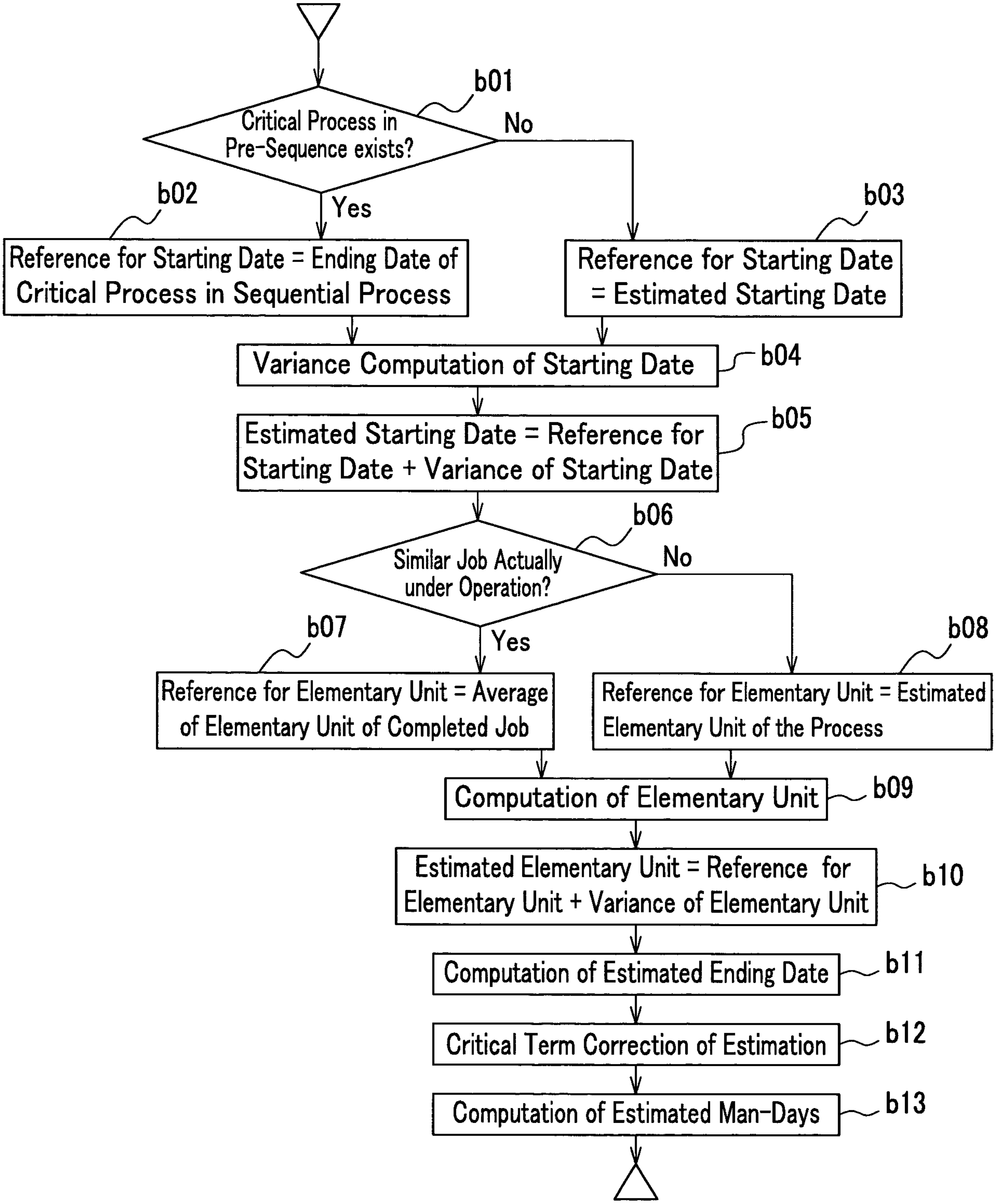

Critical Process in Pre-Sequence exists?
b01
No
Yes
b02
Reference for Starting Date = Ending Date of Critical Process in Sequential Process
b03
Reference for Starting Date = Estimated Starting Date
Variance Computation of Starting Date
b04
Estimated Starting Date = Reference for Starting Date + Variance of Starting Date
b05
Similar Job Actually under Operation?
b06
No
Yes
b07
Reference for Elementary Unit = Average of Elementary Unit of Completed Job
b08
Reference for Elementary Unit = Estimated Elementary Unit of the Process
Computation of Elementary Unit
b09
Estimated Elementary Unit = Reference for Elementary Unit + Variance of Elementary Unit
b10
Computation of Estimated Ending Date
b11
Critical Term Correction of Estimation
b12
Computation of Estimated Man-Days
b13

FIG.10

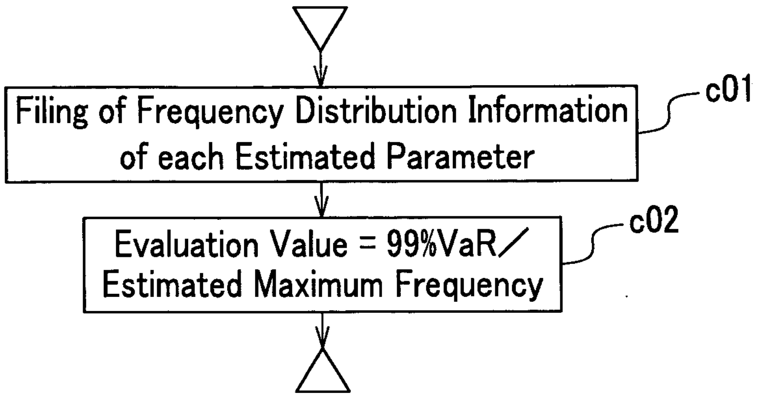

Filing of Frequency Distribution Information of each Estimated Parameter
c01
Evaluation Value = 99%VaR／Estimated Maximum Frequency
c02

FIG.11

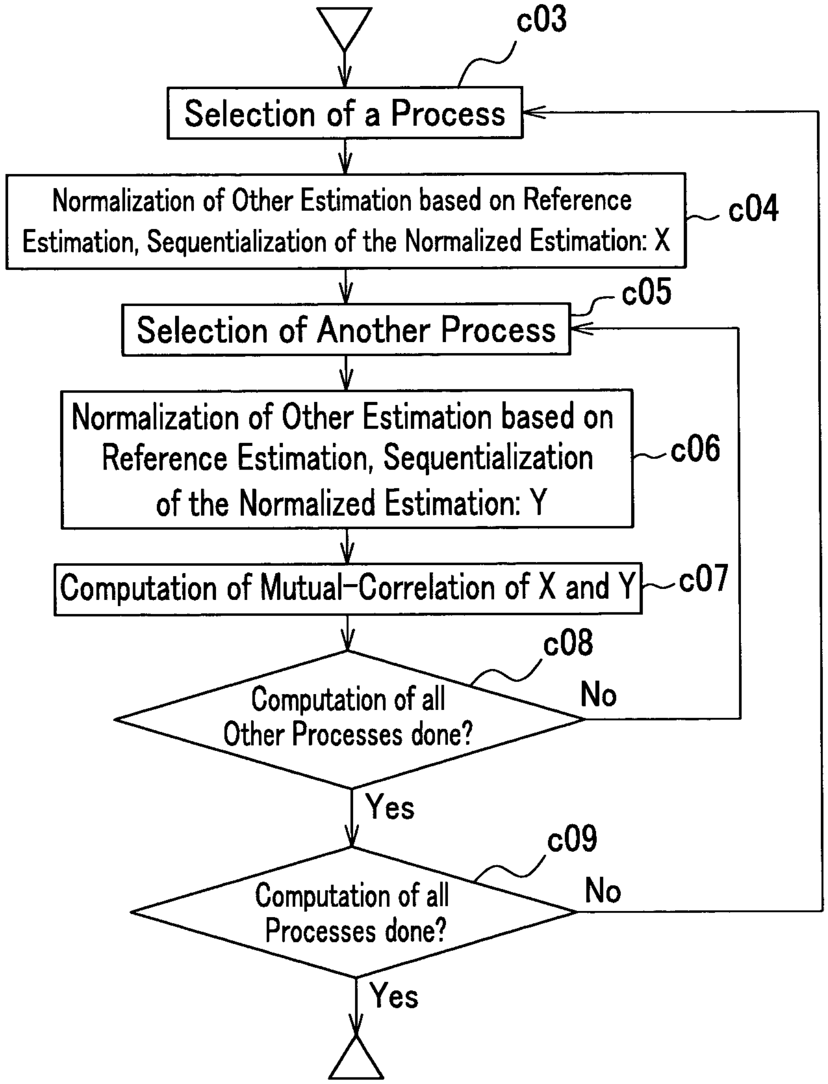

c03
Selection of a Process
Normalization of Other Estimation based on Reference Estimation, Sequentialization of the Normalized Estimation: X
c04
Selection of Another Process
c05
Normalization of Other Estimation based on Reference Estimation, Sequentialization of the Normalized Estimation: Y
c06
Computation of Mutual-Correlation of X and Y
c07
c08
Computation of all Other Processes done?
No
Yes
c09
Computation of all Processes done?
No
Yes

FIG.12

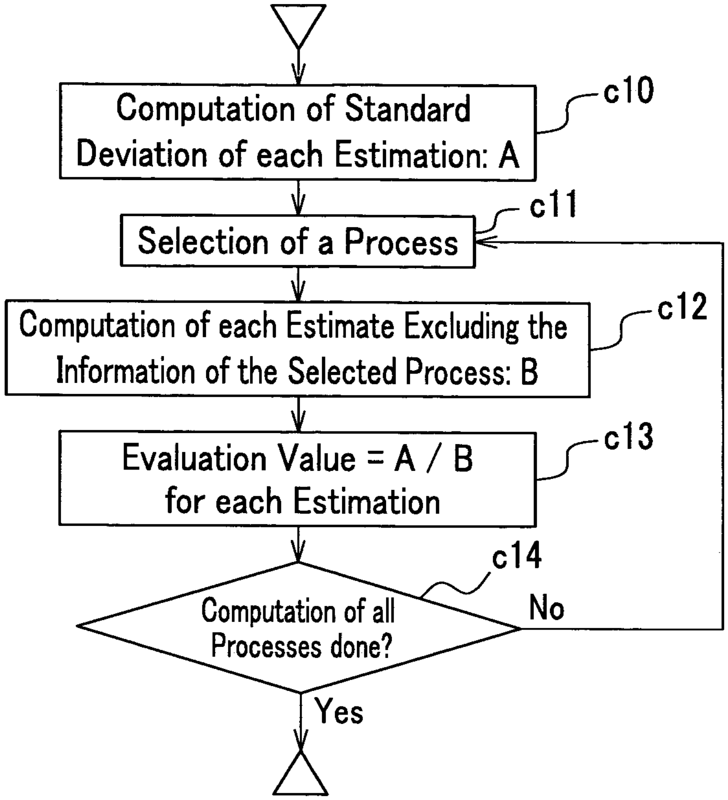

Computation of Standard Deviation of each Estimation: A
c10
Selection of a Process
c11
Computation of each Estimate Excluding the Information of the Selected Process: B
c12
Evaluation Value = A / B for each Estimation
c13
c14
Computation of all Processes done?
No
Yes

FIG.13

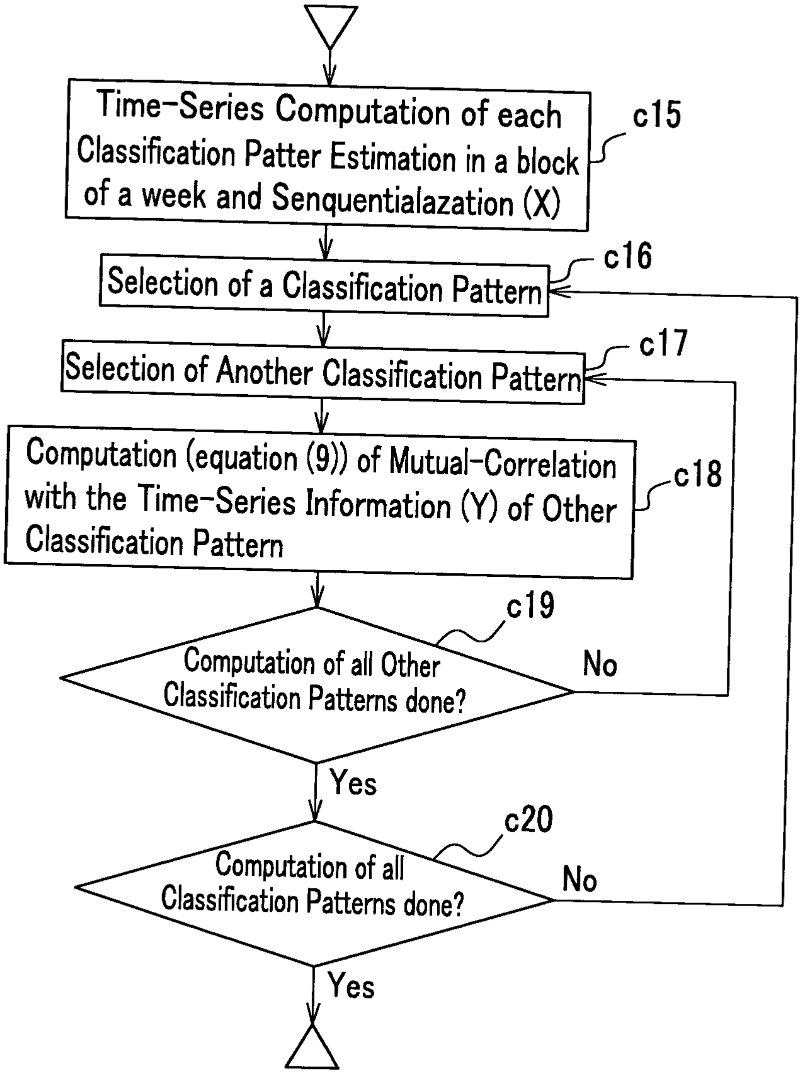

Time-Series Computation of each Classification Patter Estimation in a block of a week and Senquentialazation (X)
c15
Selection of a Classification Pattern
c16
Selection of Another Classification Pattern
c17
Computation (equation (9)) of Mutual-Correlation with the Time-Series Information (Y) of Other Classification Pattern
c18
Computation of all Other Classification Patterns done?
c19
No
Yes
Computation of all Classification Patterns done?
c20
No
Yes

FIG.14

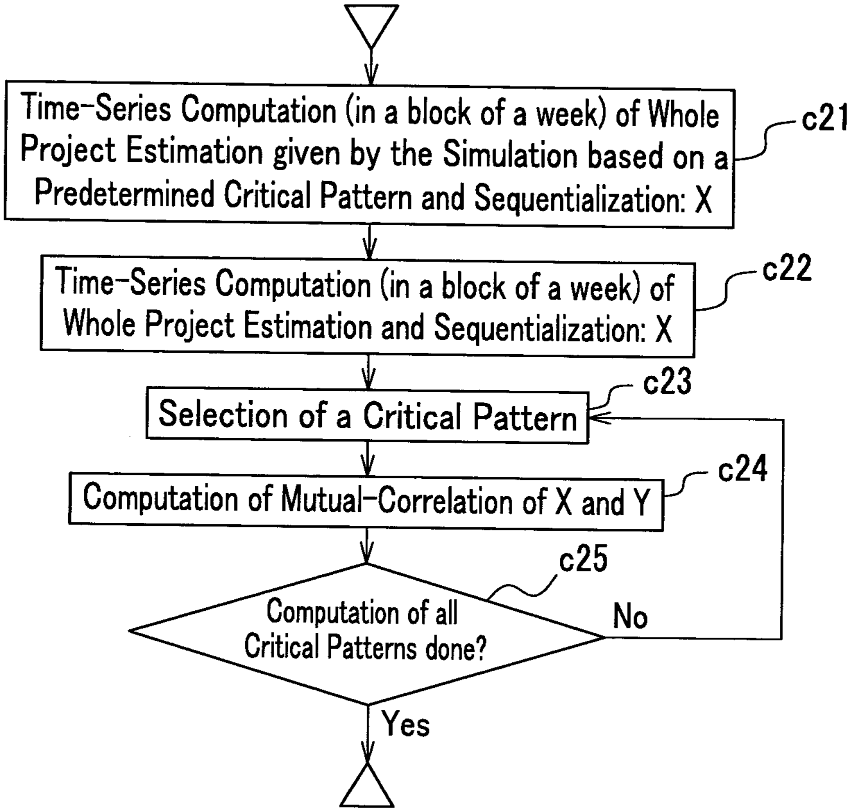
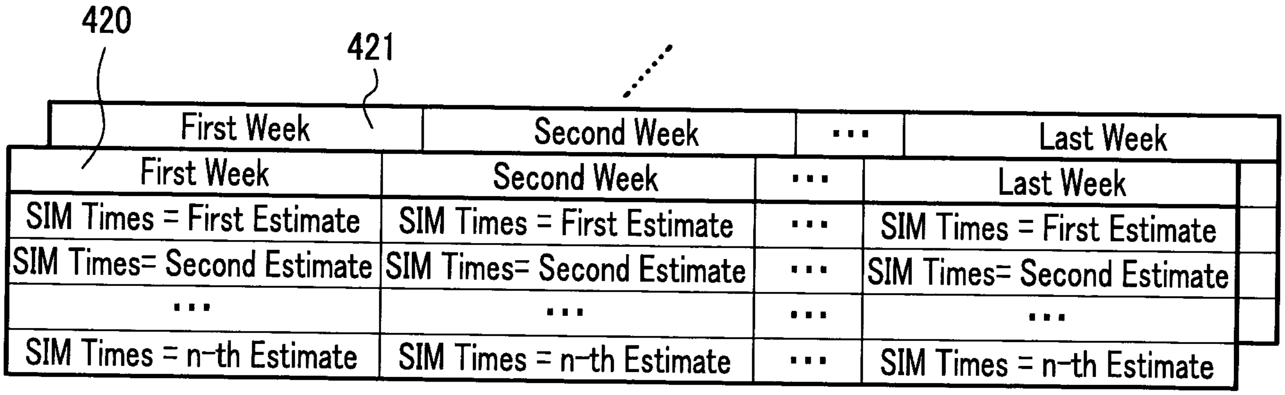

Time-Series Computation (in a block of a week) of Whole Project Estimation given by the Simulation based on a Predetermined Critical Pattern and Sequentialization: X
c21
Time-Series Computation (in a block of a week) of Whole Project Estimation and Sequentialization: X
c22
Selection of a Critical Pattern
c23
Computation of Mutual-Correlation of X and Y
c24
Computation of all Critical Patterns done?
c25
No
Yes

FIG.15



First Week	Second Week	･･･	Last Week
SIM Times = First Estimate	SIM Times = First Estimate	･･･	SIM Times = First Estimate
SIM Times= Second Estimate	SIM Times= Second Estimate	･･･	SIM Times= Second Estimate
･･･	･･･	･･･	･･･
SIM Times = n-th Estimate	SIM Times = n-th Estimate	･･･	SIM Times = n-th Estimate

FIG.16

	Estimation	Evaluation Value
422	Starting Date	124.258
423	Ending Date	54.120
424	Elementary Unit	2.147
425	Man-Days	12.785

FIG.17

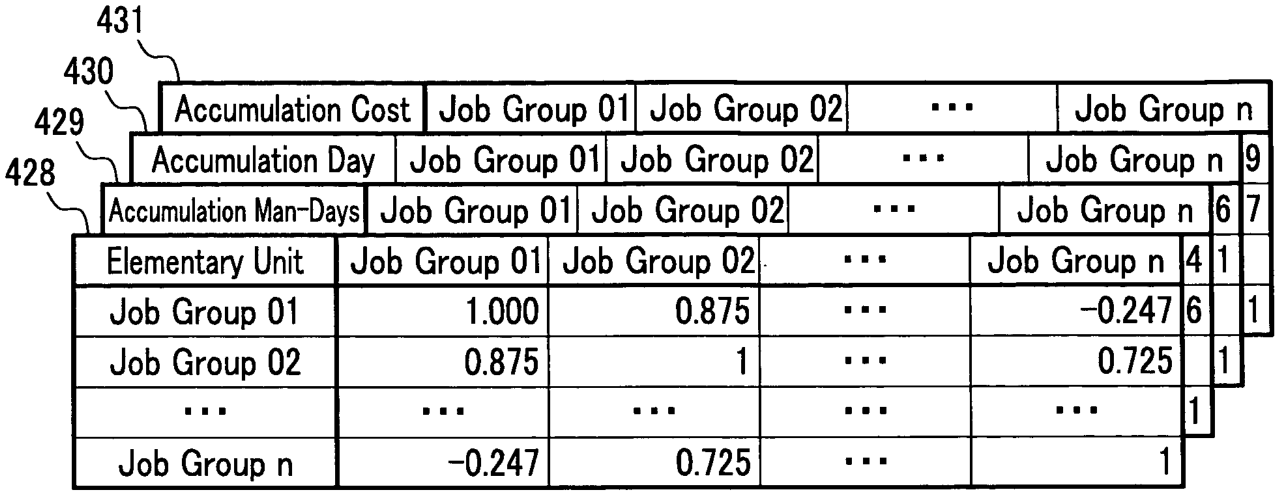
426

	Process 01	Process 02	···	Process n
Process 01	1	0.875	···	-0.247
Process 02	0.875	1	···	0.725
···	···	···	···	···
Process n	-0.247	0.725	···	1

FIG.18

	Evaluation Value	
Standard Deviation excluding Process 01	0.874	427
Standard Deviation excluding Process 02	2.457	
···	···	
Standard Deviation excluding Process n	0.975	

FIG.19


431
430
429
428
Accumulation Cost
Job Group 01
Job Group 02
···
Job Group n
Accumulation Day
Job Group 01
Job Group 02
···
Job Group n
9
Accumulation Man-Days
Job Group 01
Job Group 02
···
Job Group n
6
7
4
1
6
1
1
1

Elementary Unit	Job Group 01	Job Group 02	···	Job Group n
Job Group 01	1.000	0.875	···	−0.247
Job Group 02	0.875	1	···	0.725
···	···	···	···	···
Job Group n	−0.247	0.725	···	1

FIG.20

		436	437	438	439
		Shortage of Man-Days	Delay of Completion	Large Change of Specitications	Large Supplementation of Specitications
432	Task Operation Term	0.857	0.957	−0.875	0.974
433	Elementary Unit	0.635	−0.257	−0.253	0.363
434	Cost	−0.278	0.875	−0.367	0.1245
435	Man-Days	−0.247	0.725	0.873	0.541

FIG.21

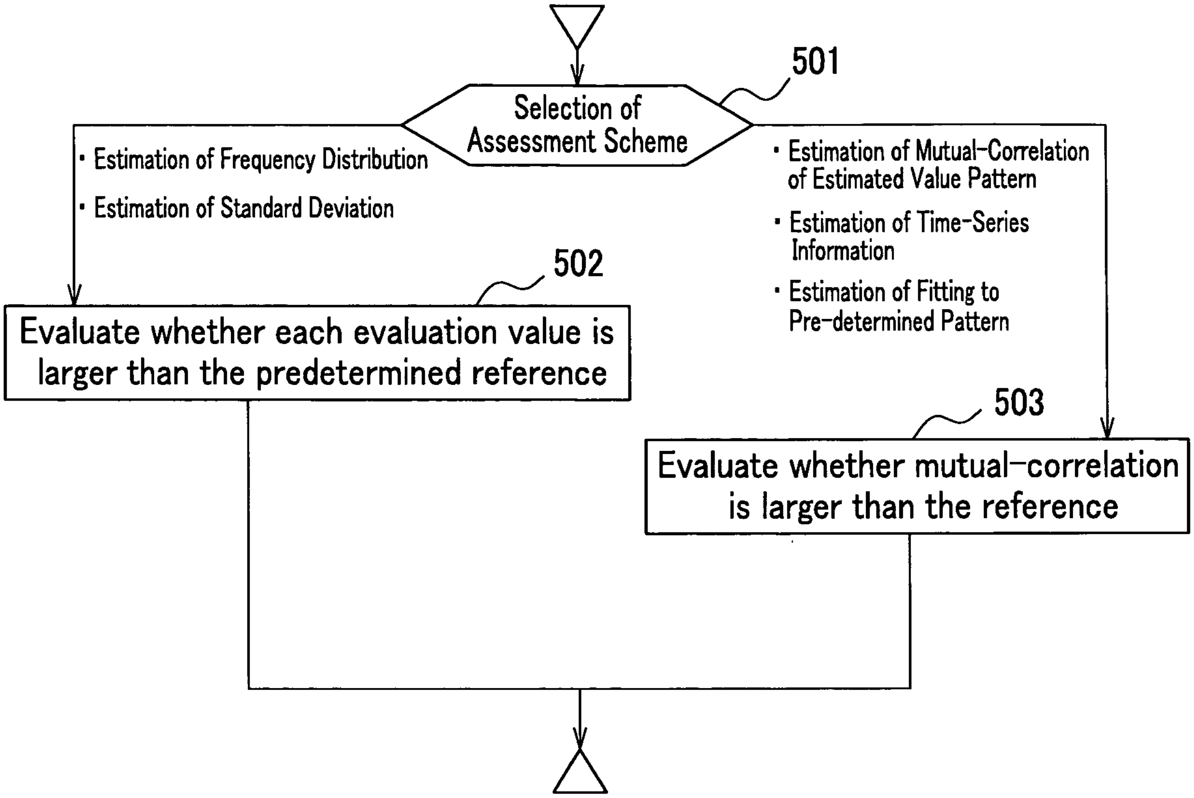
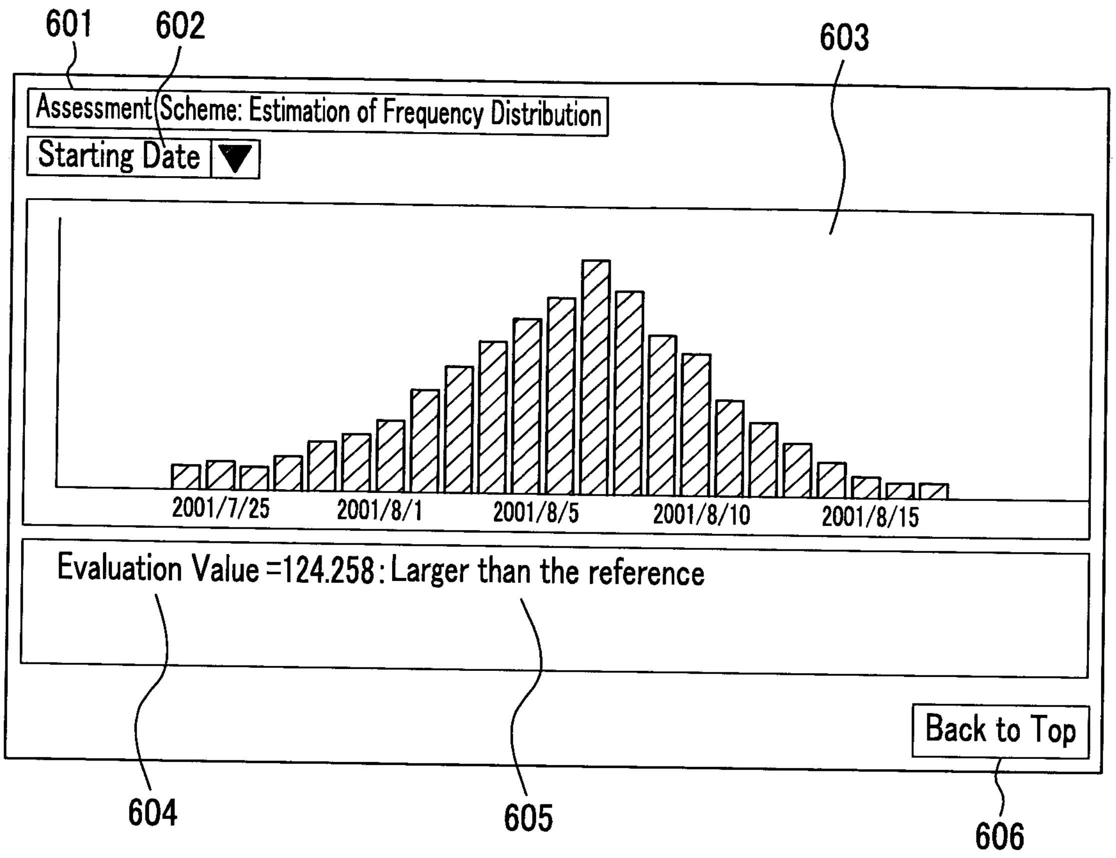

Selection of Assessment Scheme
501
· Estimation of Frequency Distribution
· Estimation of Standard Deviation
· Estimation of Mutual-Correlation of Estimated Value Pattern
· Estimation of Time-Series Information
· Estimation of Fitting to Pre-determined Pattern
502
Evaluate whether each evaluation value is larger than the predetermined reference
503
Evaluate whether mutual-correlation is larger than the reference

FIG.22

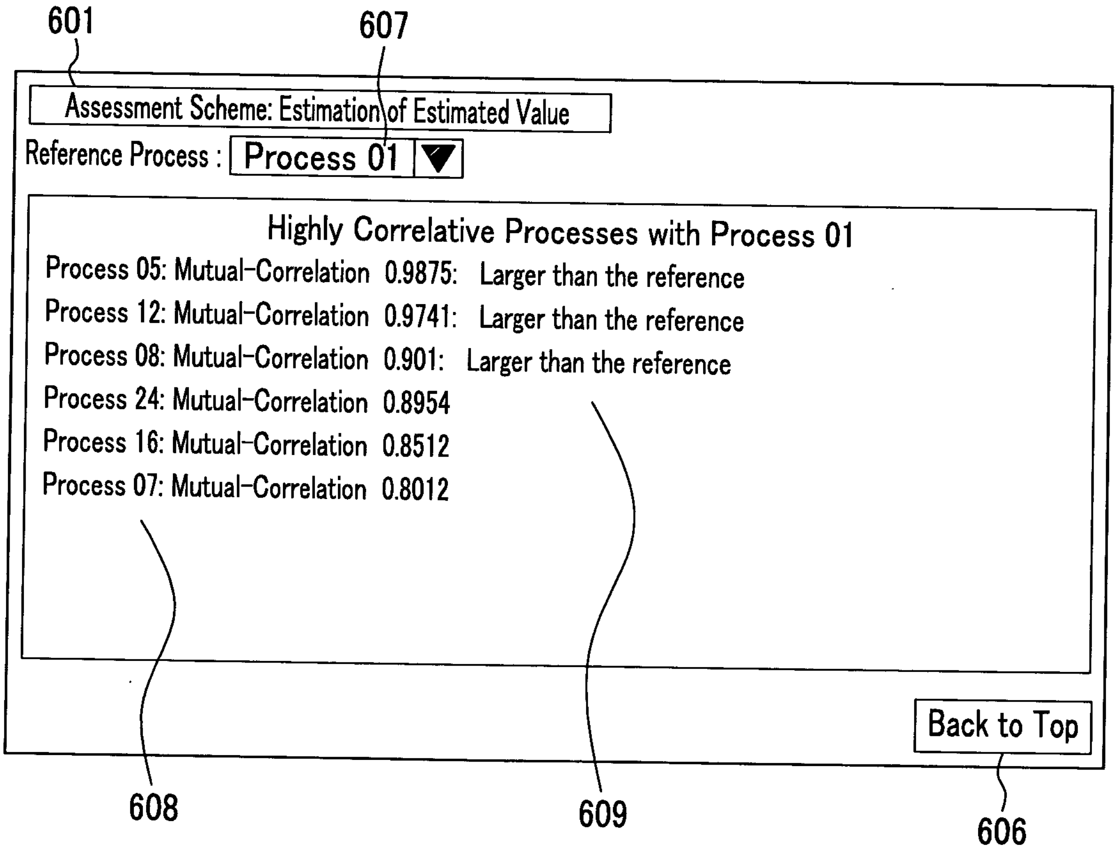


Assessment Scheme: Estimation of Frequency Distribution

Starting Date ▼

Evaluation Value =124.258 : Larger than the reference

FIG.23



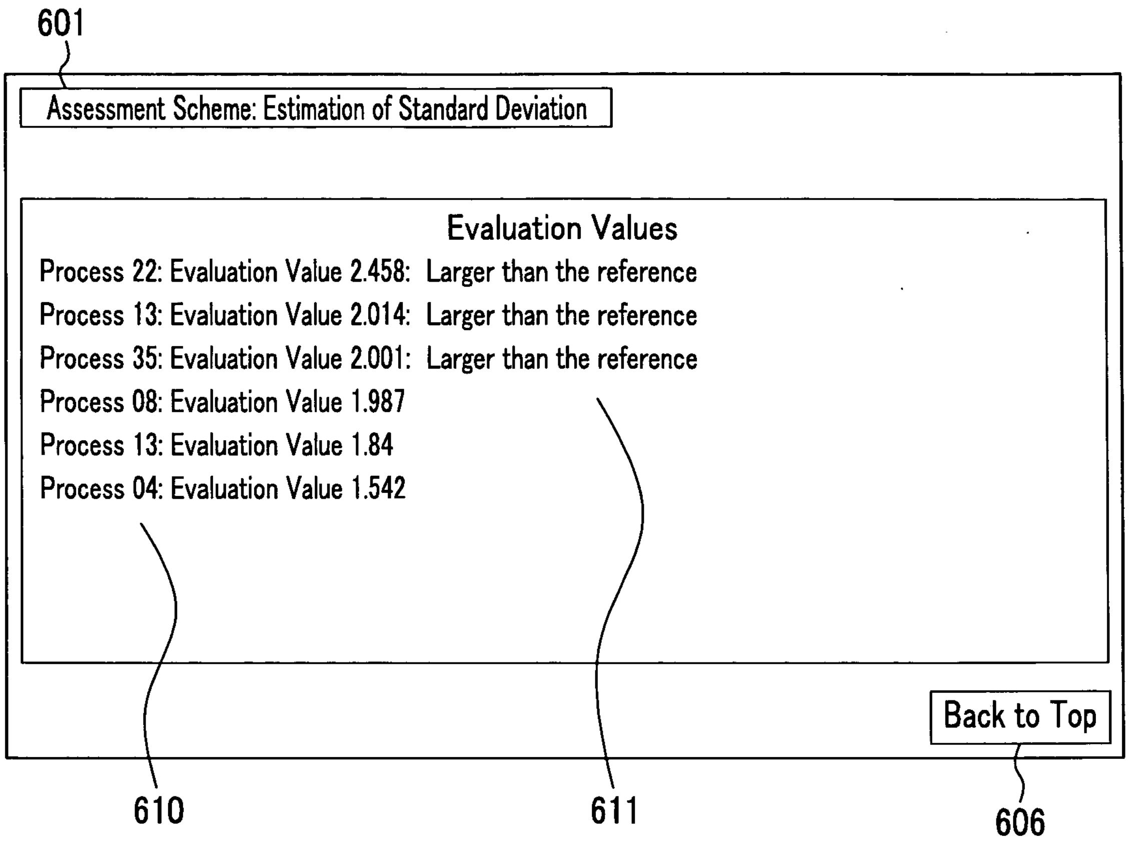
Assessment Scheme: Estimation of Estimated Value

Reference Process : Process 01 ▼

Highly Correlative Processes with Process 01

Process 05: Mutual-Correlation 0.9875: Larger than the reference
Process 12: Mutual-Correlation 0.9741: Larger than the reference
Process 08: Mutual-Correlation 0.901: Larger than the reference
Process 24: Mutual-Correlation 0.8954
Process 16: Mutual-Correlation 0.8512
Process 07: Mutual-Correlation 0.8012

FIG.24

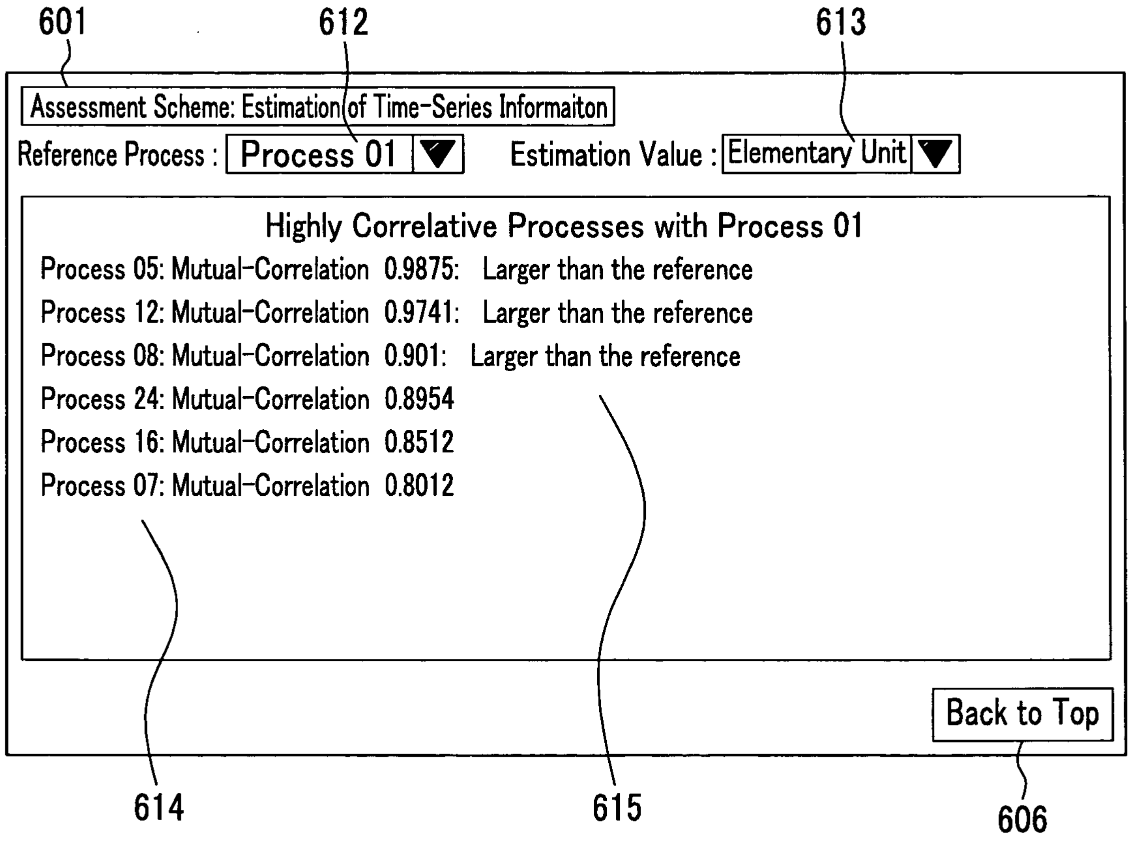


Assessment Scheme: Estimation of Standard Deviation

Evaluation Values

Process 22: Evaluation Value 2.458: Larger than the reference
Process 13: Evaluation Value 2.014: Larger than the reference
Process 35: Evaluation Value 2.001: Larger than the reference
Process 08: Evaluation Value 1.987
Process 13: Evaluation Value 1.84
Process 04: Evaluation Value 1.542

FIG.25



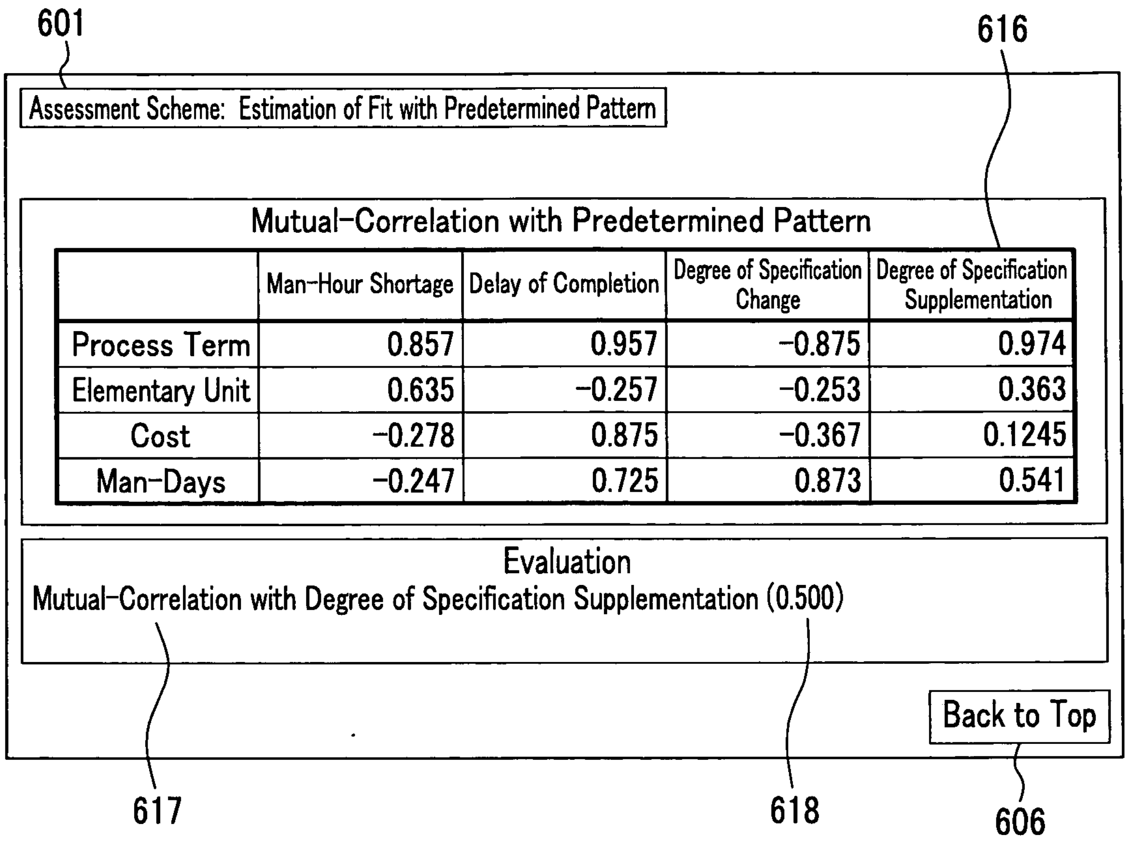
Assessment Scheme: Estimation of Time-Series Informaiton

Reference Process : Process 01 ▼ Estimation Value : Elementary Unit ▼

Highly Correlative Processes with Process 01

Process 05: Mutual-Correlation 0.9875: Larger than the reference
Process 12: Mutual-Correlation 0.9741: Larger than the reference
Process 08: Mutual-Correlation 0.901: Larger than the reference
Process 24: Mutual-Correlation 0.8954
Process 16: Mutual-Correlation 0.8512
Process 07: Mutual-Correlation 0.8012

FIG.26



Assessment Scheme: Estimation of Fit with Predetermined Pattern

Mutual-Correlation with Predetermined Pattern

	Man-Hour Shortage	Delay of Completion	Degree of Specification Change	Degree of Specification Supplementation
Process Term	0.857	0.957	−0.875	0.974
Elementary Unit	0.635	−0.257	−0.253	0.363
Cost	−0.278	0.875	−0.367	0.1245
Man-Days	−0.247	0.725	0.873	0.541

Evaluation
Mutual-Correlation with Degree of Specification Supplementation (0.500)

FIG.27